The Tray System for Insect Collections

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After considerable thought and investigation, the Department of Entomology of the Kansas Agricultural College has adopted the tray system for the permanent insect collection.* This brief account, embodying the advantages of this system, is given in the hope that it might be of value to workers in other institutions in the state.

History of the Tray System

The tray idea probably originated with geologists who, for many years, have used small pasteboard trays or boxes for minerals or rock fragments. The use of the pasteboard trays for insects probably was suggested by the old Comstock system, upon which it is an improvement. The only published account of the system is by Aldrich (1919)**. The trays were first used for an insect collection by the United States National Museum, where the details and plans were worked out in 1910 and 1911 by Messrs. Rohwer, Crawford and Viereck. Mr. Rohwer stated (in littera that "Mr. Crawford devoted a great deal of his time to planning out satisfactory sizes and I may say that we tried a number of different sizes, not only in the width of the trays, but also in the length, and after trying out all of them we believe that the system we accepted is the most practicable. It was first put in use in the Hymenoptera, with the smaller at that, but later we expanded it to all of the sections of the Hymenoptera and gradually workers in other groups took it up, until now all of us, with the exception of groups of the Macrolepidoptera and the Odonata, think that it is by far the most satisfactory way of housing the collection."

This system is now used by the University of Minnesota, Iowa State College (in both cases being introduced by Dr. H. H. Knight), at Mississippi State College, at Cornell University for the Hymenoptera, and the American Museum of Natural History for certain groups. Several other institutions have been considering seriously its adoption and probably have done so by this time.

Explanation of the Tray System

This system makes use of small, white pasteboard trays of uniform

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*.Aldrich, J. M. The Division of Insects in the U. S. National Museum. Annual Report Smithsonian Inst. for 1919, 1921. 367-379. 15 pl.

width, but of several different lengths, in which sheet cork is glued. The sizes used by the United States National Museum and adopted by us are as follows:

Size 1—1¼x4x1⅜ inches; requires a cork strip 1x3 13-16 inches
Size 2— 2x4x1⅜ inches; requires a cork strip 1 13-16x3 13-16 in.
Size 3— 4x4x1⅜ inches; requires a cork strip 3 13-16x3 13-16 in.
Size 4—7¾x4x1⅜ inches; requires a cork strip 7 5-6x3 13-16 in.

The U. S. National Museum has recently introduced a half column width tray of the smallest size for species represented by only one or a very few specimens. This improvement makes it possible to fit two tiers of trays into the ordinary column, and an appreciable saving of space is attained.

The trays are of good grade of heavy pasteboard with the outsides covered with white glazed paper. This is glued on the bottom and on the inside of the tray, the strip overlapping in each case being about one-half inch. The trays are manufactured by machine and are of uniform measurements.

These trays are kept in a drawer similar to the old Comstock case. The U. S. National Museum drawers measure, on the outside, 18x18x2¼ inches. The glass lid is tight fitting, with a tongue and groove jointing on the two sides and the back edge, but with a ocveled edge in front. The groove in which the tongue on the lid fits is open to the bottom of the box. This groove around the box may be filled with flake napthalene or paradichlorobenzene crystals to keep out museum pests.

It is planned to keep these trays in a steel fire-proof cabinet, but until these can be purchased, they will be kept in an oak cabinet holding 100 drawers in four tiers of 25 each.

Advantages of the Tray System

1. It is well adapted to a growing collection. When the specimens are correctly determined, each species is pinned in an appropriate sized tray which is then placed in the drawers in the proper systematic position. When other species are added, the trays may be shifted ahead with a great saving in time over the Schmitt box method and without handling the specimens.

2. It minimizes the handling of specimens and thereby removes the greatest possibility of breakage. Specimens once placed in the trays, if correctly determined, need not be removed. When it is desired to examine some determined material to identify by comparison, the entire tray is removed and the specimens examined under a binocular. The box affords a coonvenient way of handling the specimens, the entire determined series with the usual variations are before one, and there is very little probability that the determined specimens will be put back under another determination heading. It is not unusual to find isolated specimens in the wrong group in the Schmitt boxes. Some taxonomists now put a determination label on every specimen to counteract this situation.

3. It makes possible the placing of galls, leaf mines or typical injury with the adults causing them.

4. It makes possible the keeping together of biological series, rearings from a single gall, collections from a certain host, or in a certain restricted habitat as is done in the United States National Museum.

5. Broken parts can be readily associated with the proper species, or with the proper specimen, for they will be found in the tray. Slides of parts of specimens or in toto mounts can be placed in the trays with the particular species or specimens. Special wood slots are glued in the ends of the trays to hold the slides in place.

6. The danger of damage from museum pests is slightly reduced by the many partitions in the drawers and by the increased amount of napthalene or paradichlorobenzene which, by the way, is hidden from view and does not, therefore, detract from the appearance of the box. The drawers do not need replenishing with the repellent as often as with the Schmitt box or Comstock box.

7. The danger of breakage from loose moth balls is eliminated. It is not uncommon for the moth balls in which heated pins have been imbedded to become loose or drop off of the head of the pins when evaporated to half their size. In either case, they may roll around in the box, with disastrous results. Where the naphthalene flakes are kept in glass cups, as is done at the Museum of Comparative Zoology, this danger is eliminated, but then the boxes must always be handled right side up.

8. It provides a big advantage over the Schmitt box for identification by comparison and reduces damage from opening and closing the lid. The name of the genera and in some cases some or all of the species are typewritten on a card which is held by a label bracket on the right (or left side if desired) of the front of the box. The glass top makes it possible to get the desired information many times without opening the lid. The glass is very close to the specimens, there being only one-eighth to one-fourth inch clearance above the heads of the pins. In the Schmitt box, the lid must alway be raised and the inrush of air often damages the delicate wings of moths, neuropteroids, termites, May flies and similar forms. This danger is reduced with the large glass-topped drawer used in the tray system.

Disadvantages of the Tray System

No really important disadvantages have developed, but the following, however, have been suggested.

1. At the prices paid by some institutions, the tray system is the most expensive yet devised. But, according to the prices paid by the Kansas State Agricultural College, the cost is approximately the same as with the Schmitt box system which has been in use there. Without going into details of costs, it probably will be sufficient to point out that Schmitt boxes now cost $2.75 each. The drawers used for the trays were made by the college Building and Repair Dpeartment for $2.78 each for one order of 50, and $3.15 each for a later order of 50 boxes. The pasteboard trays cost $24.00 per

M. for sizes 1 and 2; $26.00 per M. for size 3, and $30.00 for size 4. The cork for the trays cost forty cents a sheet 11x15 inches. These sheets were sawed to the proper sizes with a small circular saw, after which they were glued in the trays with LePage's glue. Since there is a tendency for the cork to bulge, even when weighted down while drying, probably it is a better plan to pin the sheet cork in the bottom of the trays, which can be done with four ordinary pins pushed in horizontally from the outside of the trays, so as to enter the cork. The tray system, at present prices, is a little more expensive than the Comstock box system, but the latter has most of the disadvantages which the Schmitt box has.

2. This system does not provide for ready examination of the under part of the body or wings of pinned insects. The only boxes, so far as the writer knows, which allows for this are the glass-bottomed Comstock boxes used by Dr. W. T. M. Forbes at Cornell University. Strips of soft wood are tacked or glued at regular intervals in the bottom and the Lepidoptera are then pinned to the strips.

3. Insects in the drawers would be damaged if the drawers were inverted. Since the space between the glass and the pin-head is only one-fourth inch, the trays will not become disarranged if the drawer is full. Furthermore, there is no occassion for inverting the boxes, but it may occur by accident. The old Comstock system, using flat pieces of soft wood had this very serious objection which is largely responsible for its disuse.

4. It requires somewhat more space with the trays to care for the larger specimens. This is true and to offset this disadvantage, some institutions glue a sheet of cork in the drawer and pin large specimens in it, omitting the trays.

This system has the recommendation of all the taxonomists which were consulted, or about a dozen of the leading ones. Some institutions would adopt it if it were not for the fact that they already have so much money invested in other boxes. Other institutions, or those in which their insect collections are not now in proper form, should investigate this system before continuing with other less efficient and more cumbersome systems, or before spending further sums for continuing them.

INSECT DRAWERS USED IN U. S. NATIONAL MUSEUM

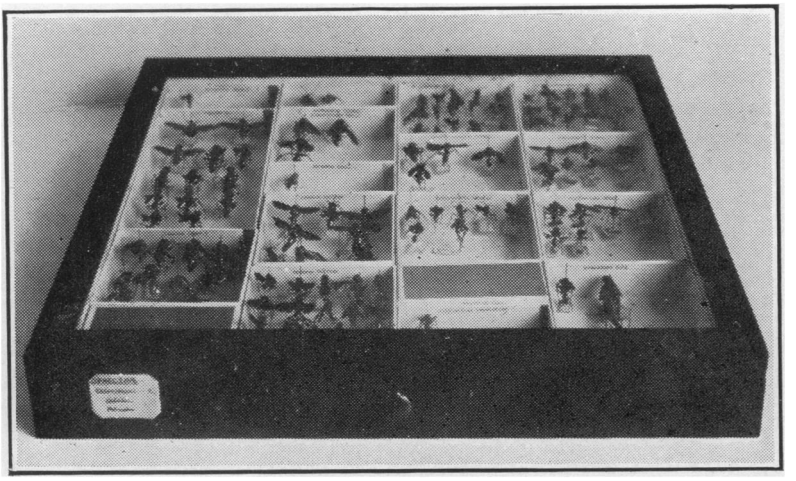

Figure 1: Note that name label is glued to front end of tray. The colored slips placed at right fore margin of each tray designate the Zoogeographical Region from which the specimens came. To designate these regions the following colors were used: Palaearctic, green; Oriental, yellow; Aethiopian, blue; Australian, black; Neotropical, pink or reddish; Nearctic, no color applied to tray. This sample illustrates all sizes of trays except the entire column tray which is usually used for "blocking" purposes only.

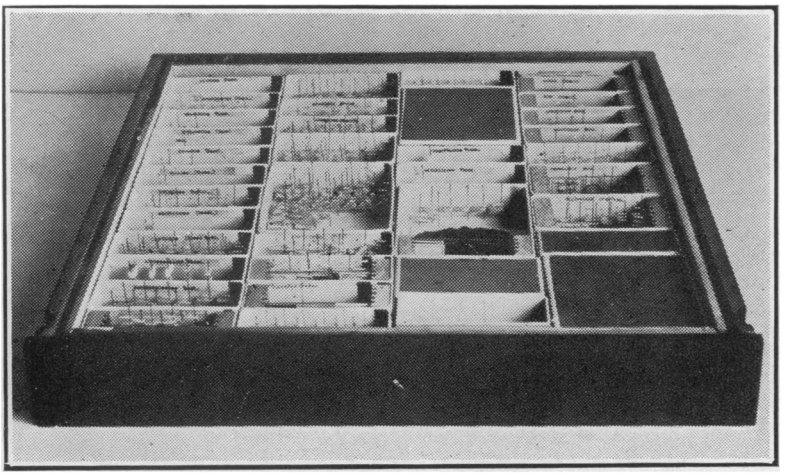

Figure 2: Note how slides are fitted into especially prepared trays in which may also be pinned the adults from which the parts mounted on slides were removed. Note also the naphthalene chamber which surrounds the drawer.
(Photographs loaned by the U. S. National Museum through the courtesy of Mr. S. A. Rohwer.)